

General Description

概述

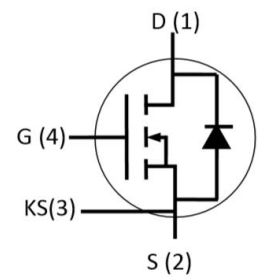
Specifically designed for Automotive applications, this SiC Power MOSFET utilizes the latest processing techniques to achieve extremely low on-resistance per unit area.

本产品是一款专为汽车应用设计的碳化硅功率MOSFET产品，采用了最先进的工艺技术，产品的单位面积导通电阻非常低。

Features

特点

- High Speed Switching with Low Capacitances
开关速度快，寄生电容小
- High Blocking Voltage with Low $R_{DS(on)}$
阻断电压高，开通电阻低
- 100% avalanche tested
100%通过雪崩测试
- Halogen Free and RoHS Compliant
无卤元素，符合 RoHS



Typical Applications

典型应用

- EV Charging
EV 充电
- DC-AC Inverters
DC-AC 转换器
- High Voltage DC/DC Converters
高压 DC/DC 变压器
- Power Factor Correction Modules
功率因子校正模块

Ordering Information

订货信息

Type 型号	$BV_{DSS}[V]$ 漏极-源极电压	$R_{DS(on)}[m\Omega]$ 导通电阻	$T_{jmax}[^{\circ}C]$ 最高结温	Marking 标记	Packing 封装外形
BSK160S120	1200	160	175	BSK160S120	TO247-4



Maximum Rated Values

最大额定参数

Parameter 参数	Symbol 符号	Value 数值	Unit 单位
Drain-Source Voltage, $T_j \geq 25^\circ\text{C}$ 漏-源电压, $T_j \geq 25^\circ\text{C}$	V_{DSS}	1200	V
Drain Current(continuous)at $T_c=25^\circ\text{C}$ 常温下漏极电流(持续)	I_{D}	17	A
Drain Current(continuous)at $T_c=100^\circ\text{C}$ $T_c=100^\circ\text{C}$ 下漏极电流(持续)		11	
Pulsed Drain current, t_p limited by T_j max 集电极脉冲电流, 脉宽时间受 T_j max 限制	$I_{\text{D,pulse}}$	38	
Gate-Source Voltage 栅极-源极电压	V_{GSS}	-10/+25	V
Gate-Source Voltage (Recommended operational values) 栅极-源极电压(推荐工作电压)	V_{GSS}	-5/+20	V
Power Dissipation $T_c = 25^\circ\text{C}$ (Fig.10) 常温耗散功率	P_{D}	153	W
Storage Temperature Range 储存温度范围	$T_{\text{J,Tstg}}$	-55 to +175	°C
Solder Temperature 焊接温度	T_{L}	260	
Operating junction temperature Range 工作结温	T_{J}	-55 to +175	

Caution: These values must not be exceeded under any conditions.

注意：任何条件下都不能超出上述值。

Thermal Resistance

热阻

Parameter 参数	Symbol 符号	Value 值	Unit 单位
Thermal Resistance, Junction to Case, Max. 结-管壳热阻(Fig.11)	$R_{\theta\text{JC}}$	0.98	°C/W
Thermal Resistance, Junction to Ambient, Max. 结-环境热阻	$R_{\theta\text{JA}}$	40	



Electrical Characteristic at T_j = 25°C (unless otherwise specified)

T_j=25°C时电学特性（除非特别声明）

Parameter 参数	Symbol 符号	Conditions 条件	Value 值			Unit 单位
			Min. 最小值	Typ. 典型值	Max. 最大值	

Static Characteristic

静态特性

Drain to Source Breakdown Voltage 漏极-源极电压击穿电压	BV _{DSS}	V _{GS} =0V, I _D =100μA T _J =25°C	1200	-	-	V
Zero Gate Voltage Drain Current 栅源短路的漏极电流	I _{DSS}	V _{DS} =1200V, V _{GS} =0V, T _J =25°C	-	0.7	100	uA
Gate to Body Leakage Current 栅极-源极漏泄电流	I _{GSS}	V _{GS} =20V, V _{DS} =0V	-	-	200	nA
Static Drain-source On Resistance ^(Fig.4) 漏极-源极通态电阻	R _{DS(on)}	V _{GS} =20V, I _D =10A, T _J =25°C	-	160	192	mΩ
		V _{GS} =20V, I _D =10A, T _J =150°C	-	285	-	
Gate Threshold Voltage ^(Fig.6) 栅极-源极阈值电压	V _{GS(th)}	V _{DS} =V _{GS} , I _{DS} =2.5mA T _J =25°C	2.0	-	4.0	V
		V _{DS} =V _{GS} , I _{DS} =2.5mA T _J =150°C	-	1.8	-	
Gate Resistance 栅极电阻	R _G	f=1MHz, V _{AC} =25mV	-	5.8	-	Ω

Dynamic Characteristic

动态特性

Input Capacitance ^(Fig.8) 输入电容	C _{iss}	V _{DD} =1000V, f=1MHz, V _{GS} =0V, V _{AC} =25mV	-	950	-	pF
Output Capacitance 输出电容	C _{oss}		-	35	-	
Reverse Transfer Capacitance 反向传输电容	C _{rss}		-	8.5	-	
Total Gate Charge ^(Fig.9) 栅极总电荷	Q _{g(tot)}	V _{DD} =800V, I _D =10A, V _{GS} =-5/20V	-	42	-	nC
Gate-source Charge 栅-源电荷	Q _{gs}		-	9	-	
Gate-Drain Charge 栅-漏电荷	Q _{gd}		-	17	-	



Switching Characteristic at $T_j=25^\circ\text{C}$ (Inductive Load)

$T_j=25^\circ\text{C}$ 时开关特性（电感负载）

Parameter 参数	Symbol 符号	Conditions 条件	Value 值			Unit 单位
			Min. 最小 值	Typ. 典型 值	Max. 最大 值	
MOSFET Characteristic						
MOSFET 特性						
Turn-on delay time 开通延迟时间	$t_{d(on)}$	$V_{DS}=800\text{V},$ $V_{GS}=-5/20\text{V},$ $I_D=10\text{A},$ $R_{G(ext)}=2.5\Omega,$ $R_L=80\Omega,$ $T_j=25^\circ\text{C};$	-	12	-	ns
Rise time 上升时间	t_r		-	20	-	
Turn-off delay time 关断延迟时间	$t_{d(off)}$		-	15	-	
Fall time 下降时间	t_f		-	10	-	
Turn-on Switching Energy 开通损耗	Eon	$V_{DS}=800\text{V},$ $V_{GS}=-5/20\text{V},$ $I_D=10\text{A},$ $R_{G(ext)}=2.5\Omega,$ $L=256\mu\text{H},$ $T_j=25^\circ\text{C}$	-	95	-	μJ
Turn-off Switching Energy 关断损耗	Eoff		-	48	-	

SOURCE-DRAIN DIODE CHARACTERISTICS

源极-漏极二极管特性

Source to Drain Diode Forward Voltage ^(Fig.7) 源极-漏极正向电压	V_{SD}	$V_{GS}=-5\text{V},$ $I_{SD}=5\text{A},$ $T_j=25^\circ\text{C};$	-	3.5	-	V
		$V_{GS}=-5\text{V},$ $I_{SD}=5\text{A},$ $T_j=150^\circ\text{C};$	-	3.3	-	
Continuous Diode Forward Current 正向电流	I_S	$T_C=25^\circ\text{C};$	-	-	17	A
Reverse recovery time 反向恢复时间	t_{rr}	$T_j=25^\circ\text{C},$ $V_{GS}=-5\text{V}$ $V_R=800\text{V},$ $I_{SD}=10\text{A},$ $diF/dt=1000\text{A}/\mu\text{s}$	-	27	-	ns
Recovered charge 恢复电荷	Q_{rr}		-	123	-	μC
Peak reverse recovery current 反向峰值电流	I_{rrm}		-	8.5	-	A

Notes

a: Repetitive Rating : Pulse width limited by maximum junction temperature

b: Pulse Test : Pulse width $\leq 380\mu\text{s}$

c: Essentially independent of operating temperature

注:

a: 重复范围: 脉冲宽度受限于最大结温

b: 脉冲测试: 脉冲宽度 $\leq 380\mu\text{s}$

c: 本质上与工作温度无关

Electrical characteristics diagram
特性曲线

Figure 1. Output Characteristics $T_J = -55^\circ\text{C}$

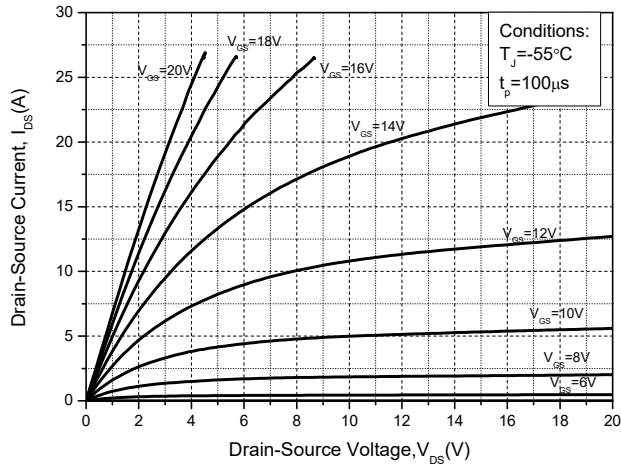


Figure 2. Output Characteristics $T_J = 25^\circ\text{C}$

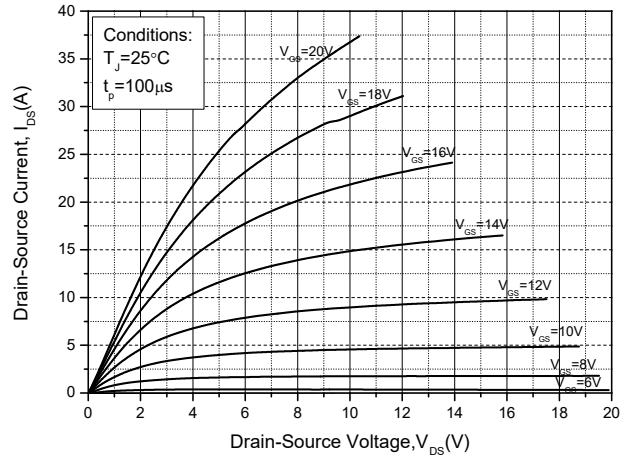


Figure 3. Output Characteristics $T_J = 175^\circ\text{C}$

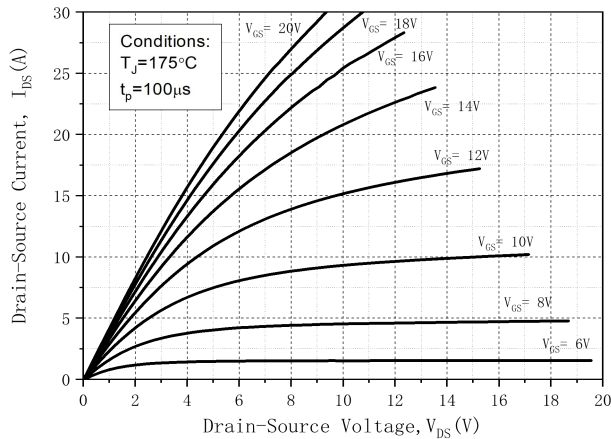


Figure 4. On-Resistance For Various Gate Voltage

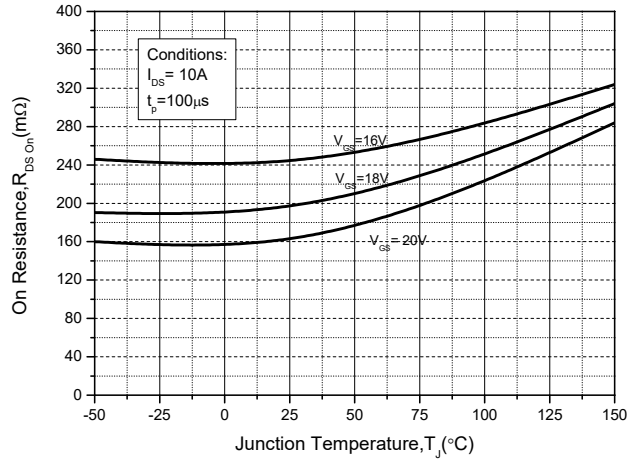


Figure 5. Transfer Characteristic for Various Junction Temperatures

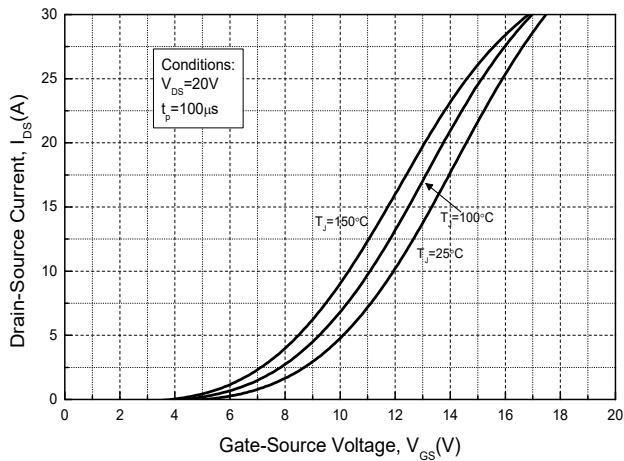


Figure 6. Threshold Voltage vs. Temperature

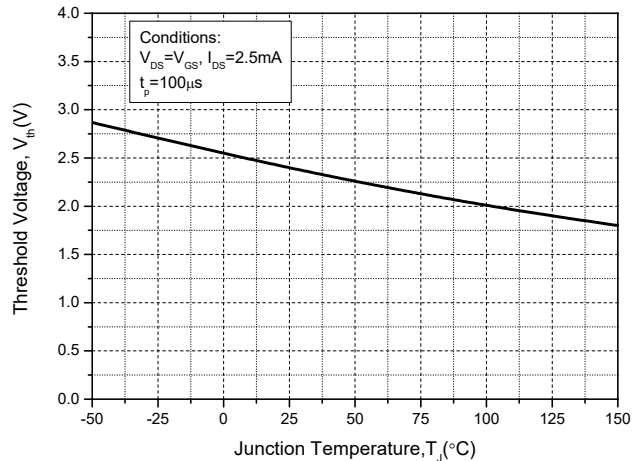


Figure 7. Body Diode Characteristics

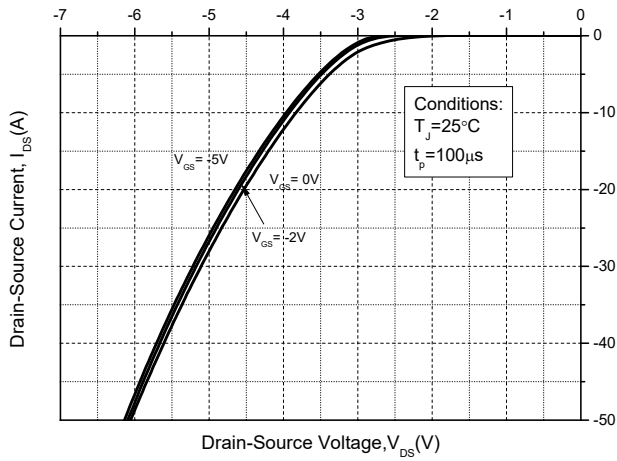


Figure 8. Capacitances vs. Drain-Source Voltage

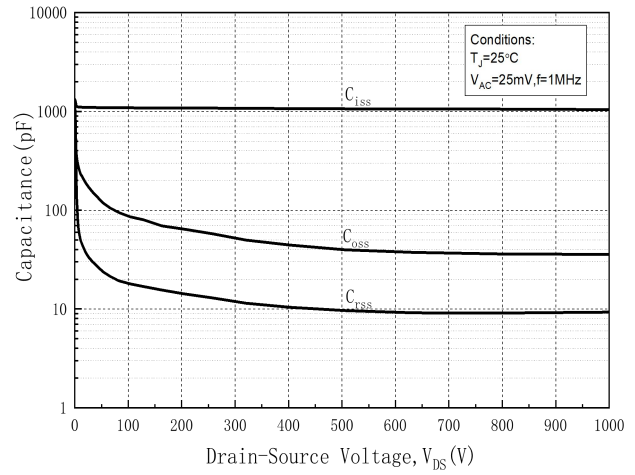


Figure 9. Gate Charge Characteristics

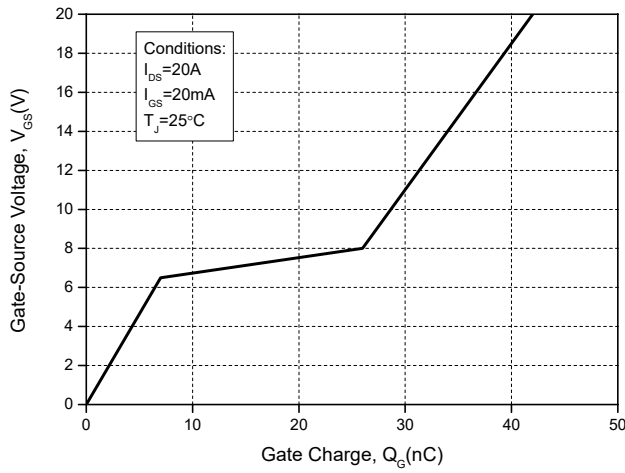


Figure 10. Power Dissipation Derating

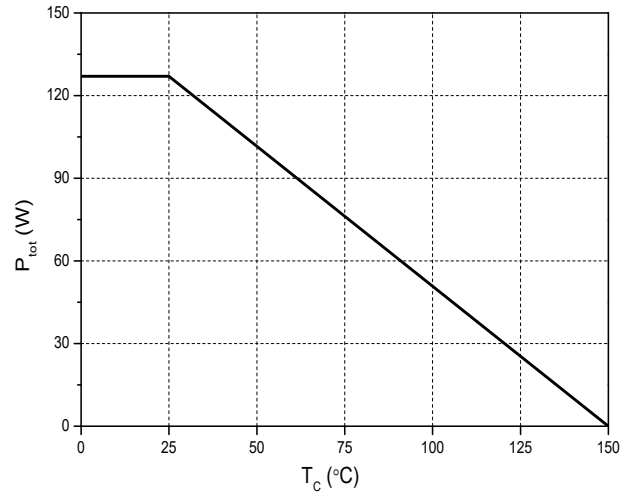
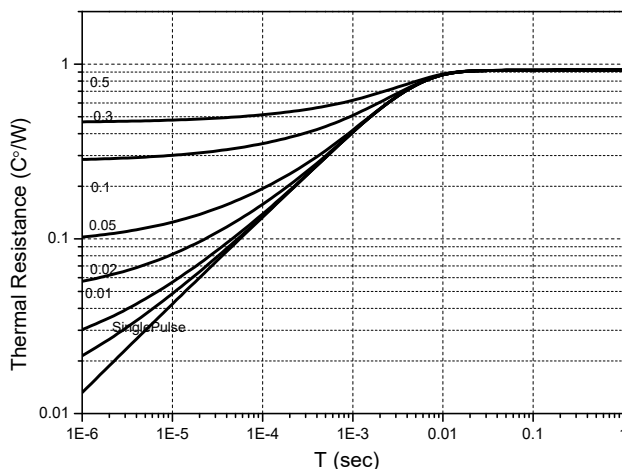


Figure 11. Transient Thermal Impedance

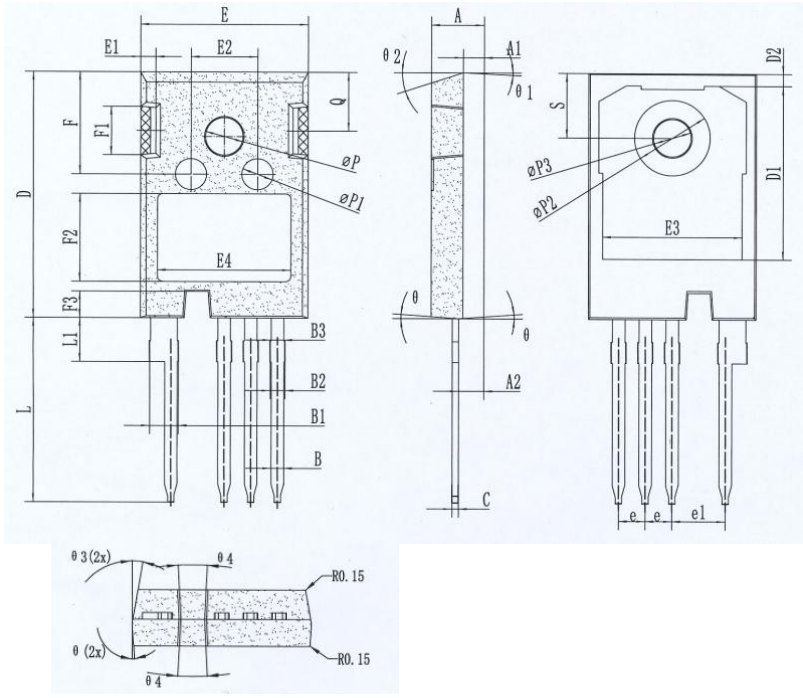




TO-247-4 Packing Outline Dimensions:

TO-247-4 封装外形尺寸

Dim.	Mechanical Dimensions /mm		
	MIN	NOM	MAX
A	4.92	5.02	5.12
A1	1.90	2.00	2.10
B	1.15	1.20	1.25
B1	2.50	2.65	2.80
C	0.55	0.60	0.65
D	23.25	23.45	23.65
D1	16.35	16.55	16.75
D2	1.02	1.17	1.32
E	15.74	15.94	16.14
E1	1.25	1.45	1.65
F	9.55	9.75	9.95
F1	4.40	4.60	4.80
e	2.34	2.54	2.74
e1	4.88	5.08	5.28
L	17.37	17.57	17.77
L1	3.97	4.17	4.37
ΦP	3.70	3.80	3.90
ΦP1	2.90	3.00	3.10
ΦP2	7.10	7.20	7.30
S	6.05	6.15	6.25
Q	5.50	5.60	5.70



Packing 包装

Package 包装	Pcs/tube 片/管	Tube/ inner box 管/内盒	Inner box/ carton 内盒/外箱	Pcs/carton 片/外箱
Tube 管	30	12	6	2160



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